

electroless copper plating.

4. (Amended) An electroless copper plating method using a plating solution containing copper sulfate as copper ion sources, and a copper ion complex agent, glyoxylic acid or salt thereof as a copper ion reducing agent, and a pH conditioner, wherein said method comprises steps of adding at least one of alkaline earth metal, alkaline earth metal oxide, alkaline earth metal hydroxide, and alkaline earth metal salt (excluding sulfuric salt) into said plating solution, and reacting with and precipitating sulfuric ions or oxalic ion as an alkaline earth metal salt during electroless copper plating.

5. (Amended) An electroless copper plating machine using a plating solution containing copper sulfate as copper ion sources, and a copper ion complex agent, glyoxylic acid or salt thereof as a copper ion reducing agent, and a pH conditioner, wherein said machine comprises an electroless copper plating bath for containing an electroless copper plating solution, a reaction bath which adds at least one of alkaline earth metal, alkaline earth metal hydroxide, alkaline earth metal oxide, and alkaline earth metal salt (excluding sulfuric salt) to said copper plating solution therein to react with and precipitate sulfuric ions and oxalic ion as alkaline earth metal salt precipitate in said plating solution, and a filter unit for separating said metal salt precipitate.

6. (Amended) An electroless copper plating machine using a plating solution containing copper sulfate as copper ion sources, and copper ion complex agent, a copper ion reducing agent, and a pH conditioner, wherein said machine comprises

an electroless copper plating bath for containing a copper plating solution, a reaction bath which adds at least one of alkaline earth metal, alkaline earth metal hydroxide, alkaline earth metal oxide, and alkaline earth metal salt (excluding sulfuric salt) to said copper plating solution therein to react with and precipitate sulfuric ions as an alkaline earth metal salt precipitate in said plating solution, a filter unit for separating said metal salt precipitate, means for measuring the concentration of sulfuric ion in said plating solution, and means for comparing said measured concentration by a preset reference concentration and controlling the quantity of said alkaline earth metal, alkaline earth metal hydroxide, alkaline earth metal oxide, or alkaline earth metal salt (excluding sulfuric salt) to be added.

7. (Amended) An electroless copper plating machine using a plating solution containing copper sulfate as copper ion sources, and a copper ion complex agent, glyoxylic acid or salt thereof as a copper ion reducing agent, and a pH conditioner, wherein said machine comprises an electroless copper plating bath for containing a copper plating solution, a reaction bath which adds at least one of alkaline earth metal, alkaline earth metal hydroxide, alkaline earth metal oxide, and alkaline earth metal salt (excluding sulfuric salt) to said copper plating solution therein to react with and precipitate sulfuric ion as an alkaline earth metal salt precipitate in said plating solution, a filter unit for separating said alkaline earth metal salt precipitate, means for measuring at least one of the sulfuric ion concentration and the oxalic ion concentration and means for comparing at least one of said measured sulfuric and oxalic concentrations by a preset reference concentration and controlling the quantity of said alkaline earth metal, alkaline earth metal hydroxide, alkaline earth

metal oxide, or alkaline earth metal salt (excluding sulfuric salt) to be added.

8. (Amended) An electroless copper plating machine using a plating solution containing metallic ions, an agent for reducing said metallic ions, and a pH conditioner, wherein said machine comprises an electroless copper plating bath, a reaction bath adding a metal or a compound containing a metal to said plating solution to precipitate ions, as a metal salt precipitate, which suppress generation of said plating metal as metal salts, and an ultra filtration unit for removing said metal salt precipitate.

9. (Amended) An electroless copper plating machine in accordance with any one of Claim 5 through Claim 8, wherein said filtration unit is a cross-flow ultra filtration unit or a filter press ultra filtration unit.